

guttural was not a characteristic element of the first personal pronoun. And yet Gesenius seems to feel no hesitation in saying that the Hebrew *Anoki* (ANKI) "is the *primary* and fuller form of *Ani*," being more frequent in the Pentateuch (but in general more rare) than the shorter form *Ani*; and in some of the later books, as the Chronicles and Ecclesiastes, wholly disappearing, just as the guttural of the Saxon has been lost in modern English, and that of the Franks in modern French. He notices that the form *Anoki* occurs on the Phœnician monuments and in the Chinese NGO. The Sanskrit used only the guttural *aha*, like the Greek, Latin, German, etc., while the Aramaic, Arabic, Abyssinian have lost it, and use the shorter nasal form of the pronoun. It seems hardly possible, therefore, to avoid the conclusion that ANK was the primitive form of the first personal pronoun, and that it stood in genetic relationship to the Egyptian symbol of life, the *anz*. Whether the symbol was constructed from the ideograph  $\bar{I}$  (a man with his arm bent pointing to his mouth) or not, I leave to the judgment of others.

But Gesenius remarks somewhere that *Anoki* is used in some Hebrew passages as an emphatic *I myself*. This would point to the constitution of the pronoun as a dissyllable, with a final KA, the well-known hieroglyph for the dead man's *spirit*.

I should like to draw attention to the identity of *ani*, the pronoun, and *ani*, the Hebrew (and generally Shemitic) word for *vessel*, not only a vase, urn, bucket, etc., for holding water especially, but also a *ship*. The human frame was called a *vessel* (of wrath or righteousness, of mercy, etc., etc.), and may easily have been originally regarded as the *vessel of life* par excellence. Were this idea feasible, it might return us to my former arkite (ship-mountain-water) interpretation of the *cruz ansata*.

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*On an Important Boring Through 2000 Feet of Trias, in Eastern Pennsylvania. By J. P. Lesley.*

(Read before the American Philosophical Society, April 3, 1891.)

The Eastern Oil Company's trial bore-hole on the Stern farm at Revere (Rufe's Corner), Bucks county, Pa., is 18 miles south of Easton, 16 miles north of Doylestown, 7 miles west of Riegelsville, 5 miles from Kintnersville, 8 miles from Munroe, 10 miles from Durham furnace, 1½ miles from Bucksville, 2½ miles from Ottsville, 4 miles from Ervina, and about 2 miles east of Haycock trap hill.

The following record was written from dictation of Mr. E. C. Rosenzi, 3414 Smedley street, Tioga, Philadelphia, February 25, 1891, Superintendent of the Company.

This is the first deep boring in the Mesozoic belt of Pennsylvania,

known to me. Had my advice been asked I should have dissuaded from a costly attempt to find oil or gas in this formation. The record of the boring, however, is valuable to the geological student as the hole descends through 2076 feet of nearly horizontal strata of gray and brown mostly soft sandstone and shale, with some dark ("black") slate, one stratum of which (called "anthracite coal") produced an excitement in the district, and was extensively published by the newspapers.

It is almost needless to say that a bed of *anthracite* coal in undisturbed strata of Mesozoic age, and at a distance from trap, would be an incredible occurrence. The trap of the Richmond, Va., field only turns the bituminous coal bed to coke.

It is also hardly necessary to explain that a "*nine foot bed* of anthracite coal" anywhere in the brownstone belt of Bucks and Montgomery counties could hardly conceal itself underground. All the strata crop out to the surface; and such a stratum could not well escape exposure. Even smaller lenticular bituminous coal seams like those on Deep and Dan rivers in North Carolina, ranging in thickness from four feet down to one foot, show somewhere at their outcrops. Even if the well record at this point of it were clearer than it is, the fact of the existence of any considerable coal bed (especially an anthracite bed) would have to be carefully verified, either by several additional trial holes, or by a shaft, before being believed by any geologist versed in the characteristic features of this formation.

Riegelsville is 166' above tide, and the Revere well mouth is supposed to be about 200 A. T. Its record is as follows:

8'	Alluvion.....	From the surface down to	8'
102	Sandstone, brown.....	Down to	118
15	Shale, red.....		133
5	Shale, bluish, soft . . . . .		138
10	Shale, blue, hard . . . . .		148
56	Sandstone, dark brown; <i>with coaly specks</i> .....		204
7	Sandstone, brown, very fine grained . . . . .		211
2	" <i>Black slate</i> ," soft.....		213
4	Shale, blue, hard . . . . .		217
223	Sandstone, red, very hard . . . . .		440
	Slate, purplish, very gritty, here.		
4	Sandstone, brown, fine grained . . . . .		444
31	Sandstone, gray, very micaceous . . . . .		475
10	Sandstone, gray, hard rock.....		485
100	Sandstone, reddish brown . . . . .		585
5	Sandstone and shale, gray . . . . .		590
5	" <i>Black slate</i> ," soft.....		595
32	Shale, reddish blue, very hard . . . . .		627
44	Sandstone, reddish brown . . . . .		671
21	Sandstone, brown, and blue shale, coarse and fine....		692

53	Sandstone, brown, coarse and fine .....	745
55	Shale, brown .....	800
77	Sandstone, bluish red, hard ; with white clay veins ..	877
63	Sandstone, brown, fine grained.....	940
40	Shale, brown, soft. " <i>Show of petroleum</i> " .....	980
30	Sandstone, brown, hard. " <i>Show of petroleum</i> ".....	1010
15	Shale, <i>grayish black</i> .....	1025
	Shale, blue, here.	
55	Sandstone, red-brown, hard .....	1080
70	Sandstone, red-brown, hard .....	1150
	<i>Here cased off the fresh surface water.</i>	
5	<i>No record of this interval</i> .....	1155
31	Shale, pink .....	1186
64	Shale, pink .....	1250
10	" <i>Black slate, hard</i> ".....	1260
90	Sandstone, red, "like the mass at 1150" .....	1350
40	" <i>Black slate, hard</i> ".....	1390
	Here, gray sandstone.	
16	Sandstone, gray, hard ; with very minute white pebbles as large as pins' heads .....	1406
3	" <i>Sand perfectly black and gritty ; boring easy</i> " .....	1409
31	Shale, light gray, gritty .....	1440
7	Shale, reddish.....	
6	Shale, dark blue.....	
42	Shale, light gray .....	
12	Shale, reddish, hard and gritty.....	1506
39	Shale, reddish.....	1545
15	Sandstone, bluish gray, fine grained rock.....	1560
9	" <i>COAL, ANTHRACITE</i> ".....	1569

Here, in answer to my verbal objections to the notes in his well-book, Mr. Rosenzi explained that the thickness might be incorrect, owing to the churning of the tools, but that it was in his opinion "certainly 5½ feet;" and that the "coal" came up in fine specks (no larger than the head of a pin) like all the other crushed and ground-up sand pumpings from the well, from top to bottom. No larger pieces were obtained; and no analyses were made. The well was worked in brackish water, which afterwards became salt water. See below at 1616, where salt was first noticed on the board walls of the derrick.

10'	" <i>Black slate rock, very hard</i> " .....	1579'
25	Sandstone, gray, fine, softer .....	1604
6	Sandstone, brown, hard rock.....	1610
6	Sandstone, gray, fine, softer .....	1616
	Here cased off the "salt water."	
8	Sandstone, first dark, then light gray .....	1624
	"Here salt water again and plenty of it."	

I could get no clear idea of this from Mr. Rosenzi's description. He first noticed the salt as a deposit from water splashed on the derrick. The salt taste was decided. He could say nothing about the flow, as the well was always full of water, but I could not learn that any stream issued from the mouth of the well.

16'	" <i>Black slate</i> , coarse, mixed with minute specks of COAL, and minute light gray pebbles .....	1640'
9	Sandstone, coffee-colored.....	1649
5	Sandstone, brown, very fine .....	1654
9	Sandstone, brown, very fine .....	1663
21	Sandstone, brown, very fine .....	1684
5	Sandstone, brown, dark .....	1689
10	Sandstone, gray, dark, hard .....	1699
5	Sandstone, gray, light, sharp.....	1704
17	Sandstone, brownish red, of usual character .....	1721
15	" <i>Black slate</i> " .....	1736

" *Cased well against salt water in black slate, at 1736.*"

"The driller remarks that here came in genuine soft black slate, which he recognized as the overlayer of the Oil Sand in Allegheny county, in the Wild Wood district where he worked." Nothing could more forcibly illustrate the ignorance of the well drillers as a class than this astounding statement; which is only exceeded by the ignorance of oil and gas speculators as a class, and the stockholders of the companies which they form, in giving ready credence to such statements from men whose only interest is that of obtaining their daily pay for boring wells.

2'	Sandstone, gray, fine, like 1604.....	1738'
14	Sandstone, brown, fine, hard.....	1752
28	Sandstone, brown, coarser.....	1780

*Cased off salt water successfully at 1782.*

5	Sandstone, brown, fine .....	1785
5	Shale, gray, hard .....	1790
30	Shale, grayish black.....	1820
9	Shale, light gray, bluish, hard .....	1829
3	" <i>Blue Monday</i> ," (a term used by the drillers in West- ern Pennsylvania).....	1832
26	Sandstone, bluish gray.....	1858
2	Shale, gray, hard .....	1860
10	Shale, brown, soft.....	1870
8	Sandstone, gray, sharp .....	1878
82	Sandstone, brown (or red), hard .....	1960
35	Shale, pink (or red), soft .....	1995
89	Sandstone, brown, coarse (February 21, 1891).....	2084

I suppose that the boring is to be carried on to greater depth.

Mr. Benjamin Smith Lyman, Assistant on the Geological Survey of the State, whose Report on the Trias Brown Sandstone Belt of Bucks, Montgomery and Chester counties, Pa., is not yet quite ready for publication, informs me that the place assigned to *coal* in the above well record would come about 11,000' below the top, or 10,000' above the bottom of his general section of the formation; the coal-bearing shales of Phoenixville being say 3500' or 4000' above the conglomerate base.

His long and exhaustive survey of the district has resulted in giving a combined thickness of more than 21,000 feet to these Mesozoic strata; in a demonstration of the duplication of its measures along the Delaware river; and in the discovery of both longitudinal and transverse anticlinal and synclinal flexures of considerable size. The latter system of folds is a very remarkable phenomenon, seeing that the folds lie with their northern ends abutting against (or riding over) the Durham hills, that range of Azoic highlands which extends from Reading into Northern New Jersey.

Mr. B. S. Lyman said:

Although the precise position of the Revere, or Rufe's Corner, well-boring has not been indicated within several hundred feet, it appears that the so-called coal bed is part of a 600 or 800 feet thick series of generally hard green and dark-red shales at something like 11,000 feet below the top of the Mesozoic rocks, mainly red shales, of Bucks and Montgomery counties, and 10,000 feet above the bottom of them, and 6000 feet above the hard blackish shales of the Phoenixville tunnel.

With a sketch he showed the course of the outcrop, a mile or so in width, of the green and dark-red shales, including the so-called coal bed and one or two other blackish shale layers, with generally a gentle north-westerly dip, from the Delaware river near Milford, N. J., along the east, south and west sides of a basin to Rufe's Corner; thence northwestward, westward and southeastward, round Stony Point and Bucksville, in saddle form, east of the Haycock mountain, nearly to Ottsville; then in almost a straight line southwestward for a dozen miles, past Perkasio and Sellersville; and five or six miles further southwest, though bending slightly northward at Tylersport upon the southeastern disappearing end of a rock saddle; but near Sunneytown bending sharply round a more important saddle so as to reach Harleysville, half a dozen miles to the southeast; and there with a like decided bend in the opposite direction, but with a wider sweep, turning southwest and then nearly west, passing a little more than a mile south of Shwenksville, and so in a straight course to the Schuylkill, between Linfield and Samatoga and some three miles below Pottstown.

The course of these comparatively hard beds is marked nearly everywhere by a decided ridge, particularly well defined between Ottsville and Sunneytown, and tunneled through at Perkasio. As the beds are partly green, their course is also indicated by the yellowish or greenish gray



color of the surface of the ground contrasted with the red on either side from the several thousand feet of red shales above and below, except where trap replaces them above for a long distance from the Haycock southwestward. The geological structure is also well shown by very numerous observed dips and strikes.

Here and there among the harder beds, exposures have been observed of a couple of blackish shale layers some three feet thick, perhaps identical with those of the boring. One was seen by the roadside near Rufe's Corner; two in a ravine a mile and a half north of Ottsville, where some digging was done half a dozen years ago in a vain search for coal of any economical value, though small traces of it appear to have been found; another exposure of blackish shales was seen half a mile west of Perkasio; and still another about a mile east of Harleysville.

It is, of course, extremely improbable that the beds with a known outcrop of about sixty miles in length, cut across by numerous streams and roads and by several railroads and even in great part by a tunnel, and familiar throughout every foot of its surface to the highly observant inhabitants of the country, could have a coal bed of any value that should never, until this well, have been discovered through any complete natural exposure or through an occasional very noticeable outcropping or blossom. Indeed, facts observable on the surface, such as measured rock exposures, combined with proper regard to their dips, strikes and relative position and elevation, could no doubt give a very complete section of all the beds pierced by the well; and perhaps that will prove to be possible even with the somewhat rough collection of materials already made. From such observations on the surface, the character and thickness of each bed is to be known far more precisely and thoroughly than could be possible from any boring however careful, and beyond all comparison with the results of an ordinary one. The difficulty of accurate information from such wells is shown by the doubt in the present case whether the so-called coal bed was nine feet in thickness or five and a half.

The well record, in spite of all the imperfections that must be expected, has value as giving for a great thickness of rock beds a connected view that may serve in some degree as a check upon the not very essential errors that might arise in combining surface observations, especially those rough ones hitherto obtained. But the chief importance of the record is perhaps as an illustration of how ready men are to lay out thousands of dollars for such explorations where the same number of hundreds would by a surface survey give fuller and more accurate information.